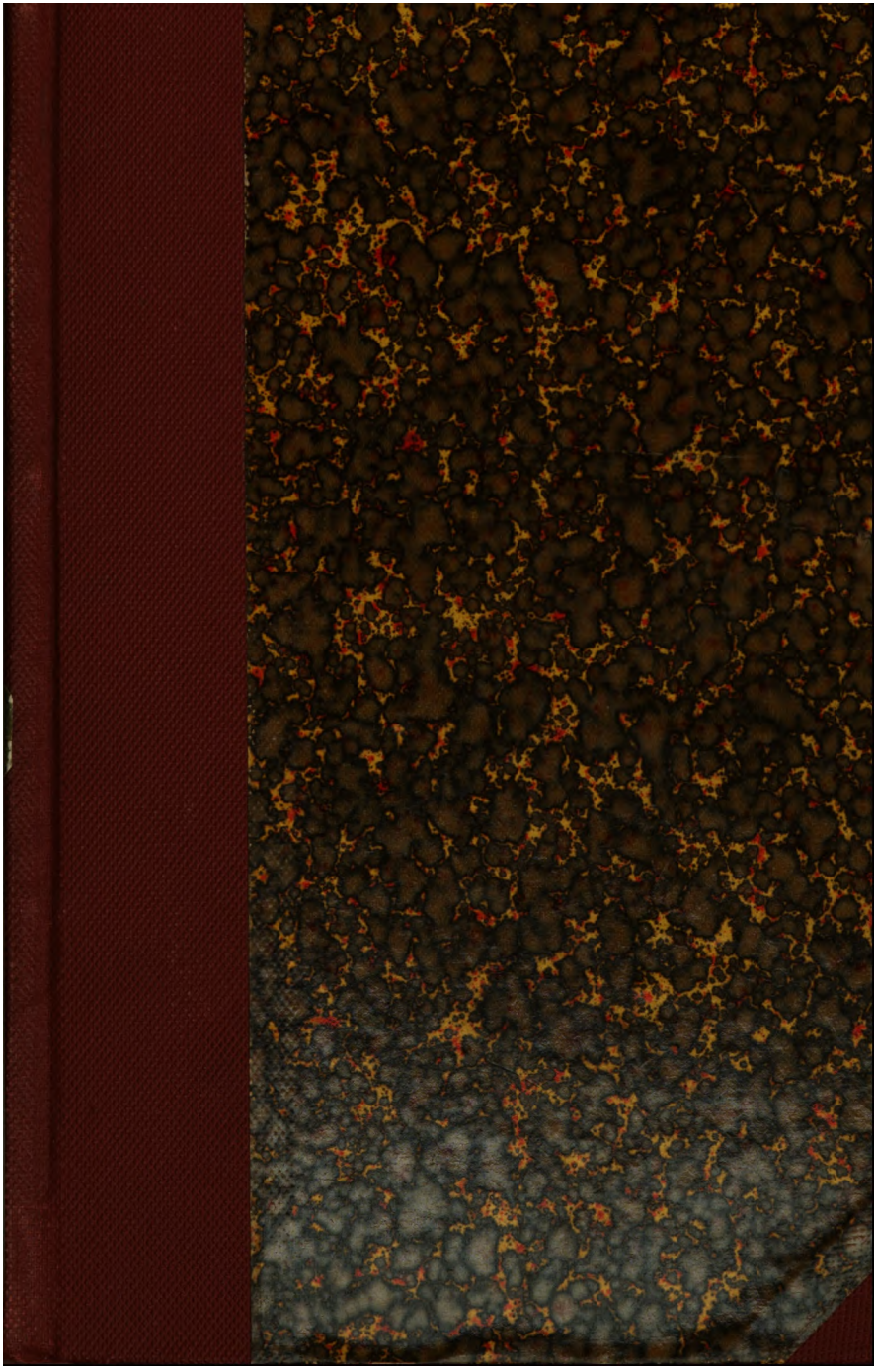

TORREYA

A Monthly Journal of Botanical Notes and News

John Torrey, 1796-1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

Volume I.

NEW YORK

1901

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MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 1 No. 1

TORREYA

January, 1901

NOTES ON RUDBECKIA HIRTA L.

By N. L. Britton

In Pittonia, 4: 174–180, recently published, Mr. Thomas V. Moore, a student of the Catholic University at Washington, working under the direction of Professor Greene, presents a valuable contribution to the arrangement and description of some of the species of *Rudbeckia* of the *hirta* group. In discussing *R. hirta* he takes exception, apparently with good reason, to the statement in Illustrated Flora, 3: 416, that this plant is native only on the western prairies, and is widely distributed in the East as a weed.

There can be no doubt, however, that the latter portion of this statement is quite true; at the time of publication of Dr. Torrey's Flora of the State of New York, in 1843, the only station for this species known in that State was near Buffalo, where it was collected by Dr. Sartwell; it is now one of the most abundant weeds in grass fields throughout, I think, nearly all portions of the State and is a pest to farmers in many counties, being exceedingly abundant everywhere within one hundred miles of New York City. No indication of its occurrence further east in the northern states is given in the first edition of Dr. Gray's Manual of 1848, where its range is cited from western New York to Wisconsin and southward. In the second edition of Dr. Gray's Manual, 1856, this is supplemented by the statement "also in southern New York (White Plains), and various parts of New England, but probably of recent introduction." In the sixth edition of Dr. Gray's Manual, 1890, the statement of the first edition is repeated, supplemented by "now common as a weed in eastern meadows, introduced with clover-seed from the West."

[The exact date of publication of each issue of Torreya is given in the succeeding number]

It was the acceptance of the ranges cited by Gray which caused the limitation by me of the native habitat of the plant to the western prairies. I find, however, on reference to Dr. Darlington's Florula Cestrica, that the plant is recorded from Chester County, Pa., in 1826, though it is there said to be not common. In the third edition of the Flora Cestrica, 1853, it is recorded by Darlington as growing in "fence-rows and thickets, not common."

In 1857, Dr. Knieskern records it in his Catalogue of Plants of Monmouth and Ocean County, New Jersey, as occurring in dry fields, not common. In the Catalogue of Plants of New Castle County, Delaware, published in 1844, the species is admitted without question. In Dr. Aikin's Catalogue of Plants of the vicinity of Baltimore, Md., 1837, the plant is said to grow in bushy meadows. According to Dr. Curtis' Catalogue of Plants of North Carolina, 1867, it is said to grow in all the districts of that State. In Dr. Elliott's Botany of South Carolina and Georgia, 1824, it is recorded as growing in dry sandy soil.

It seems to me from the above citations that the point made by Mr. Moore is well taken, and that there is no evidence that the species is not native on the Atlantic sea-board from Maryland or, perhaps, Pennsylvania, southward; that it has, however, been introduced, as Dr. Gray suggested, presumably from the West, into New York and New England, seems from its recorded history, equally certain.

SEEDLINGS OF ARISAEMA

By D. T. MacDougal

The writer has had the seedlings of *Arisaema triphyllum* and *A. Dracontium* under observation for some time in etiolation experiments and some facts of independent interest have been gathered and are presented here.

The general facts concerning the germination of *A. triphyllum* are familiar and need be recounted only briefly. The cylindrical cotyledon pushes out of the seed coats in about six

weeks after being placed in moist soil, carrying the hypocotyl and plumule. It becomes progeotropic almost immediately upon its emergence from the seed coats and pushes its way down into the soil to a depth of 8 to 10 mm. The basal or outer end of the hypocotyl next becomes slightly enlarged giving rise to one to three roots which penetrate the soil to a depth of 2 or 3 centimeters. These roots are well provided with root hairs in the earlier stages of their existence and later contract to some extent as indicated by the wrinkled epidermis, losing the root hairs previous to this process. This results, of course, in the pulling of the corm downward into the soil, and the repetition of the process in succeeding stages finally buries the adult corm to a depth of 10 cm. or more.

Shortly after root-formation has begun, the first leaf begins to grow, emerging from the cylindrical cotyledon through a rupture near the seed. By the activity of the leaf, carbohydrates are formed, and the third stage of the seedling is marked by the enlargement of the corm until it reaches a size about equal or greater than the seed, and is conical, or globose in form. Almost all of the original store in the seed is expended in the construction of the seedling in the two first stages of development.

During the course of the etiolation experiments, numbers of seeds and plants were divided into two lots, one being placed in the dark chamber and a second in the experimental laboratory. The seeds from an entire fruit of *A. Dracontium* were thus placed in two pots in January. No seedlings being visible in the first week of May the soil was explored to determine the fate of the seeds. To the great surprise of the writer numbers of seedlings were found which had undergone the development underneath the surface, and those in the dark room were indistinguishable from those grown in the light. In fact, this plant was found to offer a second example of a germination of the seed without development of the plumule, a type of procedure which is followed also by *Arum maculatum* as discovered by Scott and Sargant.*

* Scott and Sargant. On the Development of *Arum maculatum* from the Seed. Annals of Botany, 12 : 399–414. 1898.

The cylindrical cotyledon of *A. Dracontium* frees itself from the seed coats and attains a length which varies from 3 mm. to 6 to 7 mm. and pushes down into the soil. Before this extension has ceased, the base of the hypocotyl begins to enlarge and in the case of the shorter cotyledons may bring the resulting corm actually in contact with the seed. Coincidently with the swelling of the hypocotyl the appearance of two or three roots is to be noted. These are furnished with hairs and are highly contractile. In the matter of the development of the plumule the widest variation is shown. In the greater number of instances the plumule is absolutely quiescent during this germination and the formation of the corm goes forward until the seed is exhausted, when the roots go into the contractile state and pull it down into the soil with no showing of a leaf during the first stage of its development. This agrees in the main with the behavior of *Arum maculatum.* In a small number of seedlings of *A. Dracontium,* however, the first leaf may be dissected out as a small body about 3 mm. long, of which half is petiole and the other half a rolled green lamina which reaches no greater development, and never emerges from the cylindrical cotyledon in which it is enclosed. In 9 of the 70 seedlings which came under observation, the first leaf became active before the hypocotyl had doubled its thickness and before more than one root was formed, and extended, forming a petiole 3–4 cm. long and a broad lamina. The seed remains attached to the corm by the cotyledon for an unusually long period and may be seen adhering to the corms formed by leafless seedlings in their first resting period.

The seedlings of *Arum maculatum* and *Arisaema Dracontium* are thus seen to be entirely saprophytic during the first season of their development.

Ignorance of this habit of *A. Dracontium* led the writer to sacrifice a fine lot of seedlings of a hybrid between *A. Dracontium* and *A. triphyllum.* During the first season of the development of these plants only seven plumules were counted and when the second season began thirty plants were found, which led to the belief that the culture had been vitiated and the entire lot was

discarded. Fortunately some drawings had been made which preserved characters easy of interpretation in the light of subsequent discoveries.

NOTES ON THE GENUS LYCOPODIUM

By Francis E. Lloyd

Lycopodium Chamaecyparissus.—Through the courtesy of Mr. D. K. Gilbert, the writer has received specimens of this plant collected at Alder Creek, Oneida Co., N. Y., at which place it grows "plentifully in woods." This establishes the fact of the plant's distribution in this State, from which it was not hitherto reported. "The specimens were gathered in early October, and you will see that the strobiles are old and brown. Those of *L. complanatum* gathered at the same time and place were still yellowish green and show that their time of ripening is much later than that of *L. Chamaecyparissus*," writes Mr. Gilbert. This discrepancy in the time of ripening, first noted by Austin in New Jersey, is an important physiological character distinguishing the two species. Another observed difference is in the position of the rhizome, which in *L. Chamaecyparissus* is underground and in *L. complanatum* prostrate on the surface. Notes by field workers on this point should be made during the coming season.

L. pinnatum.—In August of the past year Professor S. M. Tracy and the writer were collecting in the vicinity of Biloxi, Miss., and a locality was found where this plant grows in abundance, and in perfect form. The horizontal stems are quite prostrate and thin and the leaves are confined to one plane very closely. The habitat is a very wet white or yellowish clay bank with full insolation. In the same spot *L. Carolinianum* was found growing to a good size (18 cm.). There can be no doubt of the distinct specific value of this plant. When it grows in sphagnum bogs, as was found to be the case near Auburn, Ala., a little later in the same season, the plant becomes so spindling and distorted as the result of its struggles in growing through the moss, that it becomes very difficult to recognize it.

L. alopecuroides.—This species also was found in savannahs near Biloxi. In the South the variation of the plant is quite small in amount. The arching of the stem, its thickness (4–5 mm.) and the leaf positions separate it very readily from *L. pinnatum.* Recently we advanced the notion that the presence or absence of reflexion of the sporophylls when ripe would serve to distinguish the two plants, but our observations in the South do not strengthen that view. The plants were, however, not ripe, and further observation is necessary.

L. adpressum.—The validity of this species is still open to some doubt. We found during July last, in bogs near Toms River, N. J., many plants which show the same perplexing variation recently referred to by Clute in the Fern Bulletin (9 : 8. 1901). No plant of the species was found in the South. As the plants of Toms River were by no means mature we hesitate to submit an opinion on them further than to say that forms from New Jersey, hitherto regarded as *L. alopecuroides* and *L. adpressum* are apparently the ends of a series of many intergradations. One point we think settled, namely, that the denticulations of the leaves are of no constant specific value in distinguishing species of this segregate. It is, however, worth while to point out that the plants of the *inundatum* group, from that species to *L. alopecuroides*, including the so-called *adpressum*, are to be regarded as a series of forms in a plastic condition. They seem also to be very susceptible to small changes or differences in the environment. It becomes necessary, therefore, to study them very carefully in the field, and full series of specimens should be collected with differences in habitat carefully noted. One way in which some useful work might be done by those who are in favorable conditions would be to exchange growing plants, say of *L. inundatum* and *L. alopecuroides* and to determine by cultivation in different environmental conditions whether they vary toward each other. It is also of great interest to note that the segregate has in the Old World, so far as known, only one representative, *L. inundatum.*

THE SUMMIT FLORA OF KING'S MOUNTAIN AND CROWDER'S MOUNTAIN, NORTH CAROLINA

By John K. Small

A few miles north of the southern boundary of North Carolina and many miles east of the Appalachian Mountain system, is an irregular ridge with a northeasterly and southwesterly trend. From most adjacent points this ridge is not conspicuous; in fact, it might be passed unobserved were it not for the two peaks which rise abruptly near its northeastern extremity. These peaks are known as King's Mountain and Crowder's Mountain.

The geology of the region in question is quite similar to that of the nearest portion of the Blue Ridge, while neither peak reaches an altitude of quite 1,800 feet. The top of King's Mountain is a little higher above the level of the sea than that of Crowder's Mountain.

I have visited this locality several times and have found interesting, rare and undescribed species; but it is the character of the vegetation inhabiting the summits that especially impresses one.

The summits of both mountains are small and very rugged; that of Crowder's is somewhat larger and less rugged than that of King's Mountain. On ascending the slopes of either mountain two striking features arrest the eye. They are the prevalence of a very local species which has taken the name of one of the mountains, namely *Lacinaria Regimontis*, and of the relatively rare fern, *Asplenium Bradleyi*. The main peculiarity in connection with this fern there, is that it does not confine itself to its favorite habitat, namely, overhanging cliffs; but it is, or it was up to the time I last visited the locality, very common and grew nearly everywhere, on cliffs, on ledges, on and about boulders and in loose soil.

The vegetation of the summits is almost exclusively of woody plants, and shrubby. The shrubby condition of normally large forest trees presents an extraordinary and interesting aspect. The chestnut tree, *Castanea dentata*, ranges from three to six

feet in height, nevertheless these plants produce an abundance of fruit. *Sassafras*, *Pinus Virginiana*, *Quercus Prinus*, *Diospyros* and *Oxydendrum*, all appear in the same form and stature. The common sour gum, *Nyssa sylvatica*, in like condition, exists on King's Mountain, and a single shrub of *Ilex opaca* was found on the uppermost cliffs of Crowder's Mountain.

The normally shrubby plants appear more natural. *Polycodium stamineum*, *Vaccinium vacillans* and *Quercus nana* are common to both peaks, while *Kalmia latifolia*, *Rhododendron Catawbiense*, *Gaylussacia frondosa*, *Gaylussacia resinosa* and *Batodendron arboreum* are species apparently confined to the top of King's Mountain. Only two perennial or shrubby herbs, namely *Galax aphylla* and *Paronychia argyrocoma*, exist on the summit of King's Mountain, while the summit of Crowder's Mountain is destitute of herbaceous vegetation with the exception of a fern and a few sterile plants of some sedge.

A SIMPLE DYNAMOMETER

By H. M. Richards

It is instructive to demonstrate that force is exerted by the swelling of seeds previous to germination, or, for that matter, in the imbibition of water by any substance capable of taking it up. A very simple machine for registering approximately the amount of energy involved, which perhaps may be dignified by the name of a dynamometer, is found in one of the ordinary self-registering letter scales which work by compression. A dish containing the seeds is placed on the pan of the scale, and on top of them is laid a cork, or better a glass plate, which just fits into the glass vessel without binding. The whole is placed on a retort stand and a stick, held firmly by a clamp, is placed against the glass plate. Water is now poured on, and as it runs down among the seeds they swell, and the glass cover being rigid the scale itself is depressed as a result of the pressure. It is needless to say that the weight of the dish, seeds, etc., must first be recorded. In this way an idea of the amount of force exerted by a given weight of

seeds can be obtained. It is not of course very accurate or strictly quantitative, but it is at least approximate, and suitable for comparisons, say between living and dead seeds.

The dials of these scales, as obtained in this country, are graduated in ounces, but it is not difficult to substitute a pasteboard dial and regraduate it in grammes by means of weights placed on the scale pans. This is of course preferable. The construction of these scales is so simple that there is no reason why a home-made and weaker spring could not be substituted for the one provided, and in such a manner an apparatus capable of more delicate adjustment could be obtained. With a more sensitive balance the force exerted by the downward growth of the root tip of *Vicia Faba* could be recorded.

THE RARE MOSSES OF BASHBISH FALLS

By Elizabeth G. Britton

Bashbish Falls may be reached from the Copake station of the Harlem Railroad, by a short walk, and are about one hundred miles from New York City. They are situated in a picturesque ravine with steep walls of rock and wooded slopes surrounding them. Many interesting mosses have been collected in the two expeditions which I have made to this locality, the rarest of which is *Anomobryum concinnatum*, this being the third station recorded for this species in the State. *Didymodon riparius* was collected by Mr. Williams in the stream above the Falls and on the wet cliffs were found *Didymodon rubellus*, associated with *Gymnostomum rupestre*, *Amphoridium Lapponicum*, and *Myurella Careyana*, all rare species for this region, but finding congenial moisture and shade in this sheltered ravine. *Homalia Jamesii*, *Porotrichum Allegheniense*, *Pogonatum alpinum* and *Forsströmia trichomitria* growing on wet rocks, were also collected above the Falls, and the slopes on the south side yielded *Hylocomium brevirostre* and *Dicranella heteromalla* with curved pedicels. Fine fruiting specimens of *Bryum proliferum* were also found in the region.

ECONOMY IN NATURE

By P. A. Rydberg

Rising "on stepping stones
Of their dead selves to higher things."

On Faitoute Avenue in New Orange, New Jersey, used to stand an old cherry tree, seven or eight feet in circumference. About seven feet from the ground it divided into two trunks. Just at the junction of the two there was a big hole, indicating that the tree was decayed and hollow. Nothing of peculiar interest about this tree was revealed, however, until the severe storm came in the spring of 1899, when one of the two trunks was torn down. The hollow trunk contained several bushels of cherry-pits and mulch, produced by decayed cherries and leaves. An adventitious root had sprung from the margin of the hole, ramified in this mass of decayed matter, and grown to the size of the thickness of one's wrist. Not satisfied, however, to feed only on old cherries and leaves, it had sent numerous branches into the decayed portion of the trunk, and the tree was actually feeding on itself, like the old wolf which, according to the fable, was eating its own frozen legs.

REVIEW

A "Flora of Vermont,* a list of the fern and seed-plants growing without cultivation," prepared by President Ezra Brainerd, Professor L. R. Jones and Mr. W. W. Eggleston, a committee of the Vermont Botanical Club, was issued in December, 1900. This list represents much careful and painstaking work on the part of the authors and their associates, involving a thoroughgoing revision of previously published lists of Vermont plants. The spirit in which the work has been conceived is revealed in the following words from the preface: "In every case where a name is admitted to the main list, there is an authenticated specimen deposited in one or more of the permanent herbaria of the state, or

* Brainerd, Jones and Eggleston. Flora of Vermont, a list of fern- and seed-plants growing without cultivation. 8vo. Pp. i–xii; 1–113. Burlington, 15 D. 1900. [Extracted from Twentieth Vermont Agricultural Report.]

in such other herbarium as is indicated in the accompanying note. The invariable rule has been to admit no name which has not an extant specimen back of it. This has necessarily led to the exclusion of a number of names of plants reported by earlier botanists. In many of these cases the evidence is such as to leave little doubt that the plants actually occurred as reported, and probably many of them will be rediscovered. The names of such plants are included in a supplementary list at the end of the main catalogue, and each name so appearing should be considered as a challenge to the sagacity of present botanists until the plant is again found." The main list includes a total of 1,563 species and varieties of Phanerogams and Pteridophytes. The Engler and Prantl sequence is adopted, but the nomenclature is essentially that of Gray's Manual and of the Kew Herbarium. Whatever may be our differences of opinion as to the claims of usage and expediency in nomenclatural matters (any appeal to ethical grounds being logically denied to us who accept an initial date for nomenclature), it certainly seems a violent perversion of botanical history to retain longer for one of our common ferns the generic name *Dicksonia*, a name, which, so far as the Pteridophytes are concerned, was first applied to two species of ferns so different from ours that now, by common consent, they are placed in an entirely different family. Even Sir William Jackson Hooker,* a prince of "conservatives," once wrote, "The name of *Dicksonia* surely, however, ought to be preserved to the original *D. arborescens* (*Balantium* Kaulf. * *)," and this position is maintained by Diels in the Engler and Prantl Pflanzenfamilien and by other modern writers. From an international standpoint, the attempts to preserve two Dicksonias in two different families of ferns are likely to prove a little confusing.

Those who have seen *Lycopodium Chamaecyparissus* growing side by side with *Lycopodium complanatum* and so distinct as to be readily distinguished at a distance of several feet and showing not the least tendency to intergrade will be very sceptical as to the propriety of considering it a variety of *L. complanatum.*

At the close of the work are shorter lists, representing the more important regional floras, in which we see an expression of the

* Hooker, W. J. Genera Filicum, *pl. 61 A* [text].

commendable and increasingly popular modern tendency to study plants particularly in relation to their surroundings. The pamphlet is attractively printed and is most fittingly dedicated to the well-known botanical collector, Mr. Cyrus G. Pringle. The Vermont Botanical Club is to be congratulated upon the enthusiasm and enterprise which have resulted in the publication at this time of such an important addition to the list of American local floras. [M. A. H.]

NEWS ITEMS

Professor Francis E. Lloyd, of the Teachers College, Columbia University, is soon to take a half year's leave of absence. He will spend the time in the laboratory of Professor Strasburger at Bonn.

The *Asa Gray Bulletin* and the *Plant World* have effected a consolidation, retaining the name of the latter. The place upon the editorial board which was to have been filled by the late Thomas A. Williams of the *Asa Gray Bulletin*, will be taken by Mr. Cornelius L. Shear.

Dr. William A. Murrill, whose valuable paper on "The Development of the Archegonium and Fertilization in the Hemlock Spruce (*Tsuga Canadensis* Carr.)," has recently appeared in the *Annals of Botany*, is now Instructor in Biology in the Boys' High School, New York City. Dr. Murrill received his degree from Cornell University.

The last annual meeting of the Society for Plant Morphology and Physiology was held at Baltimore, December 27th and 28th. The presidential address, entitled "A Decade of North American Palaeobotany," was given by Professor D. P. Penhallow, of McGill University. Among the papers presented were three by Dr. D. T. MacDougal, with the following titles: "Critical Points in the Relation of Light to Plants," "Propagation of *Lysimachia*," and "Germination of *Arisaema*." An account of "The Insular Flora of Mississippi and Louisiana," illustrated by lantern views, was given by Professor F. E. Lloyd. Dr. Erwin F. Smith was elected president for the ensuing year, and Professor W. F. Ganong, secretary-treasurer.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general Botany. Vol. 27, published in 1900, contained 678 pages of text and 33 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

As the supply of several of the volumes is limited, libraries desiring to complete their files should apply at once. Yearly volumes 1–5 (1870–1874), One Dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of Five Dollars. Vols. 7–16 (1880–1889), can be had complete only in orders for full sets. Vols. 17–25 (1880–1898) are furnished at the published price of Two Dollars each, except Vols. 18 and 21, which can be had only in orders for full sets.

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(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and No. 1, Part 1, of Vol. 8, has been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

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TORREYA

February, 1901

THE VALUE OF FORESTRY IN A COURSE OF NATURE STUDY

By Elizabeth Carss

Until very recently, little or no attention was paid to the care of our forest trees or to the relation of our forests to water supply and soil preservation. Forests were cut only for immediate gain with no regard to future productiveness. Tracts of land were also carelessly burned and no means taken to prevent such occurrences. The consequence is that many districts once covered by forests are now barren wastes of stumps. Farms are often seen where a good wood patch has been so reduced as scarcely to provide the household fuel. I recall one farm in northern New York where the only plot of woodland that the farmer possessed has been almost entirely cut away within the last five or ten years. At first, as the wood was abundant and the farmer felt no particular need for economy, the cutting was done in a most wanton manner. Tall stumps forty and fifty inches in height have been left, and great tree trunks have been felled and left to decay, often crushing small trees in their fall. In the same region there are two striking examples of hillsides that have been cut and burned to the ground to form "pasture." The result is scarcely satisfactory even for sheep. The soil at best was very scant and the hard rock ledges formed uneven masses to which soil could not cling without the aid of vegetation.

It is not difficult to find many illustrations of such destruction as has been described, which is the result of ignorance and con-

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sequent short-sightedness. Attempts are now being made to awaken the private owner to the necessity of care and proper management of forest areas, both for his own sake and for the interests of the country. The Division of Forestry of the Agricultural Department at Washington is making efforts to instruct owners of forest lands and to aid them in the care and preservation of such areas. To this end the Division has undertaken to provide a series of practical examples of improved treatment of private forest lands. The object of the undertaking is to show, by assisting a few owners to make a trial of new methods, that improved ways of handling timber lands are best for the owner and forest. The results of these experiments with private lands are to be published for the benefit of all.

In order that a reform may become vital in a country like this, it is necessary that the means of reform should reach not only those who are directly interested, but the many who influence the legislation of the country. The majority of people know nothing of the valuable government publications on the subject, nor appreciate the expenditure necessary for experimentation and publication of results.

How can the school aid in establishing among the people a proper estimate of the importance of the forests? We often hear that the aim of the school should be to promote social efficiency. To this end children are given calculations and illustrations from the life of trade and commerce, and are taught the ins and outs of a complex political life. While the value of this may not be disputed, there is here presented a very vital question in which both city and country children should be interested.

Elementary work in forestry may be approached through two parts of the school curriculum: geography and nature study. The subject may be introduced by simple study of trees. With very little children, only the recognition of some of the common trees by means of form, leaves, fruit and blossom, is possible. Later, the work may be expanded somewhat as suggested in the following outline originally prepared by the writer for the Teachers College Record:

I. Special tree study.

General form: branching, height and breadth of the tree.

Bark: Characteristic appearance. Does the tree shed the bark?

Compare bark of the tree studied with other common trees.

Compare the bark of the needle-leaved trees with that of some of the broad-leaved trees.

Leaf: Compare the form with other leaves that have been studied. How is the leaf fastened to the stem? Where are the leaf buds for next year? Make a careful study of buds with their wrappings. When do the leaves fall and what changes take place in the leaf before its fall?

Fruit: How fastened to the stem? Where most abundant on the tree? Kind of seeds produced by the tree?

Germination of seeds: Recognition of seeds of the common trees. Allow the seeds to sprout and examine stages of growth. Brief account of nourishment and growth of trees.

Twigs: Prominence of certain buds and smallness of others. Development of buds on different parts of the twigs; size, shape, color of buds; shape and character of bud scales. Scars on the twigs. Leaf scars; bud scars. Annual growth as shown by external markings; compare growth of different years. Growth and development of branches.

II. Field work. Recognition of individual trees at different seasons. General outline for field work: difference in height of trees; difference in foliage masses; advantage of different types growing together; trees that have the greatest number of branches; results of crowding; method of making a tree grow with a tall, straight trunk; the effect upon the wood if numerous branches are allowed to develop; method of cutting and pruning.

III. Care of trees and forests. Some ways in which destruction of forest areas has come about; fires, careless cutting, etc., insect pests, fungus growths. Ways of preventing destruction.

Let some pupil write for pamphlets. Discuss the efforts that are being made to save the trees and forests. Compare our forest tracts with forest areas in Europe.

IV. Wild life in the woods. Make a list of some of the wild animals seen in the woods in which we have been, and speak of their interesting characteristics, enemies, means of protection, etc. Life in winter, snow tracks. Hunting centers of the United States.

V. Lumbering.

1. Lumbering regions and forest reserves: Where situated in

the United States? Characteristic trees of different regions. Relation of water supply and forests. Control of erosion by forests. The effect of extensive cutting upon distribution of soil. Examples of excessive erosion and excessive deposition of soil.

2. Lumber camps: Sites chosen—reasons. Why winter is a good time for cutting and hauling. Transportation from lumber camp.
3. Saw mills: Situation; power used for operation; ways of preparing wood.

VI. Woods. Examine woodwork in the school room. Notice the different grain found. What is the grain of wood? Why do pieces of wood differ so much in grain? Examine small logs of different woods cut in cross, longitudinal and radial sections. Growth of wood—meaning of rings in the wood; green layer under the bark; injury caused by girdling trees.

It is not supposed that this outline can be carried out in all schools, but it is believed that many valuable lessons can be given along such lines of thought as are here suggested. The work as it stands is very comprehensive and is intended to be distributed throughout a course of nature study and geography.

A large part of this has been in use in the Horace Mann School in New York and has been found of great interest to the boys and girls, and it is hoped that such study in the schools will lay the foundation for an intelligent interest in the problems of forestry in the United States, and thus aid in checking the destruction which has already attained alarming proportions.

A NEW HYGROMETER SUITABLE FOR TESTING ACTION OF STOMATA

By D. T. MacDougal

Light, temperature, electricity, mechanical shock, moisture of the soil, salts in the soil, humidity of the air, winds, and prolonged darkness, exercise an influence upon the guard-cells of stomata in such manner that the pore is closed or opened when

any one of these forces acts with increased or decreased intensity upon the plant. The behavior of stomata to these factors is exceedingly various however. Thus some stomata open when the leaf is placed in water, while others close ; some stomata open in light, while others close under the effect of the sun's rays. Again, weak electric shock gives rise to one result, while a strong shock exercises the reverse action.

Any study of stomata by which their action is observed by means of a microscope will be vitiated with many errors, because in taking the epidermis from a leaf and mounting it for examination, stimuli are set up, which may cause the stoma to open or close before its original condition can be observed.

Practically all of the water given off by a leaf in transpiration passes through the stomata in the form of vapor, and the best method of ascertaining whether the stomata are opened or closed is to use some means of detection of watery vapor. This may be done in two ways, viz., by the cobalt method, in which paper saturated with cobalt nitrate placed on the leaf changes from a bluish to a reddish color in the presence of watery vapor; the second method consists in the use of a hygrometer. Several types of these instruments are in use in physiological laboratories. In one the variations in length of a strand of human hair with the changing humidity moves a lever carrying a pen which gives a constant record of the proportion of watery vapor in the air. This form has not been made suitable for testing the action of leaves. Another hygrometer consists essentially of an awn of some grass, like *Stipa*, which twists or untwists with the variations in humidity of the atmosphere. This type has been found very useful in some forms of investigation. A third form contains a thin strip of some material which curves and straightens with the varying humidity, and the best example of this type is the horn hygrometer of F. Darwin, in which the sensitive material is made of a thin strip of pressed horn. The simpler forms of hygrometer sold in the market for general use have a sensitive strip composed of two layers of material of different hygroscopicity, and the writer has devised one for testing the action of stomata which is based upon this principle. It may be made as follows :

Secure a straight piece of iron or copper wire 2 mm. in diameter and 25 cm. long, and bend a section 8 cm. long at right angles. Thrust this short arm through the axis of a cylindrical cork 15 mm. long and 8 mm. in diameter and bend the terminal 5 cm. at right angles and parallel with the long arm. Cut a strip from a developed film plate, such as are supplied by photographers, 8 cm. long and 5 mm. wide. Cut a slit in the cork parallel to the axis and thrust one end of the film in the slit. Now fasten a bristle 5 or 6 cm. long to the free end of the strip of film, which should have its convex surface uppermost. Bend the free end of the long arm of the wire upwards and at right angles, affixing a cork to the tip to which a suitable scale may be attached with glue (Fig. 1, *D*). Turn the cork on its axis until the strip would lie within 2 mm. of any surface on which the apparatus might be placed; note the position of the pointer, and place on the under surface of leaf which has been laid on a table upside down. If the stomata

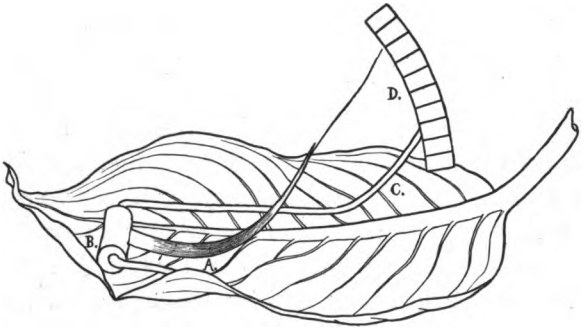

FIG. 1. Differential hygrometer. *A*, strip of film. *B*, cork. *C*, portion of wire bent upward to hold scale. *D*, scale over which the indicator has moved two divisions showing open stomata in the leaf on which the instrument rests. (Illustration from "A Practical Text-Book of Plant Physiology," by MacDougal, now in press. By permission of Longmans, Green & Co.)

are open the gelatine of the film will absorb watery vapor instantly and the strip will begin to straighten so that a movement of the indicator may be noticed inside of ten seconds. Set the hygrometer aside for a few minutes and place on the opposite side of the leaf. If it is free from open stomata no movement will be seen.

The instrument is extremely delicate and care must be taken not to blow the breath upon it while making a test, and the transpiration of the hand will give a decided reaction. Leaves attached to the plant may be tested both indoors and outdoors. It is believed that this instrument is free from most of the faults ascribed by F. Darwin to the horn hygrometer devised by him, and is quite as accurate and sensitive.

THE LYGODIUM AT HOME

By Frederick H. Blodgett

In Middlesex County, New Jersey, the climbing fern [*Lygodium palmatum* (Bernh.) Swz.] occurs in considerable abundance. The several localities are quite similar in general conditions, and a description of one will serve for an average of all.

The most accessible spot where it is found abundantly is a few miles south of New Brunswick, in the edge of the sandy area known as "the burnt woods." This is a tract of low hills and shallow hollows covered to a large extent with various scrub oaks and laurel. Many of the hollows contain water, either as nearly stagnant ponds, or as bogs of sphagnum and other aquatic plants. It is in one of these sphagnum bogs that the *Lygodium* grows.

Swamp maples and other water-loving trees surround the bog, giving place to the lower forms as the edge of the peat is reached, so that the surface of the sphagnum is nearly free from shade during the greater part of the day. Near the west end of the bog there are three colonies of *Lygodium*, a small one at the southwest, another at the northwest, and the third at the apex of a triangle, nearly equilateral, formed by the three. The fern grows among and entwines the low shrubbery and stout herbaceous plants forming the border of the sphagnum area of the swamp.

The largest colony is that in the northwest corner of the swamp. Here, on the 22nd of last December, the stems of golden-

rod and similar plants were closely entwined by the coils of the fern for nearly four feet from the ground. The fruiting pinnules were very abundant and formed nearly half the length of the fronds. Six or more fronds were often twined about the same stem, forming a loosely coiled rope. The pinnules of such masses would make the diameter of the whole reach three or four inches—a dense cluster of fine brownish lobes, contrasting with the brighter green of the less dissected and fewer sterile pinnules lower on the stem. Following the slender fronds downward, the dark brown rootstocks are found covered with about an inch of moss and leaf-mould, among the roots of the plants which support the fronds. The rootstocks, which usually bear only a few, from one to three, fronds, are often branched, throwing off one branch at a time, and they persist for a number of years, so that a length of a foot or more is not rare.

While the plants appear to require abundant moisture, they are not common in the sphagnum of the swamp, but are confined quite strictly to the growth of stout herbaceous plants and low shrubs along the bog margin, or on islands of similar growth in the midst of the sphagnum.

The large colony just described covers about a square rod at the edge of the bog, but extends through the undergrowth for a considerable distance from the open swamp. Along the sides of a drainage ditch it is quite luxuriant but does not equal the more exposed plants. Here the soil has only a thin layer of moss and leaf-mould upon it, the rootstocks being more directly in contact with the wet sand below. In some portions of the swamp area there are clay beds, but the *Lygodium* has not been observed in their immediate vicinity.

The sterile pinnules of the climbing fern were almost grass-green on December 22nd, but the fertile ones were turning brown. Nearly all other foliage had been killed and browned by the severe frosts, so that the color of the fern was in striking contrast to its surroundings. But conspicuous as its color was, it was not easily seen until close at hand, owing to the mass of dead sedge stalks, of golden-rods and briers in the midst of which the plants are located.

A NEW SENECIO FROM PENNSYLVANIA

By N. L. Britton

In the course of a field excursion of the Torrey Club and the Philadelphia Botanical Club on May 29, 1899, at Penn Valley and Tullytown, Bucks Co., Pa., my attention was called by Mr. Joseph Crawford to a *Senecio* growing in abundance in a marshy meadow at Tullytown, which seemed different from any described species. The plant was in full flower at the time and its bright yellow rays were a conspicuous feature in the landscape. Ripe fruiting specimens were secured from the same place by Mr. Crawford on June 6, 1900.

The locality had already been considerably explored by the Philadelphia botanists and is interesting from the large number of pine-barren plants which inhabit it, the soil being very sandy.

The new species resembles both *Senecio Balsamitae* Muhl., of dry soil, and *S. Robbinsii* Oakes, of northern meadows, but is, I think, distinct from either. I append a description.

Senecio Crawfordii.—Perennial, with slender thread-like roots, glabrous, or with sparse woolly pubescence below. Stem slender, about 4 dm. high : leaves thick, firm, the basal ones erect, the larger 2–2.5 dm. long, the blades oval, oblong, or some of them narrowly obovate, mostly not more than one-half as long as the slender petioles, sharply and nearly equally serrate from the acute or obtuse apex to the entire cuneate base, or the lower teeth somewhat larger than the upper ; stem leaves lanceolate or narrower, mostly acuminate, incised-serrate, clasping, the upper sessile, the lower petioled, the uppermost very small : heads 3–7 ; peduncles 1.5–10 cm. long, slender, bracted, rarely forked ; involucre 7–9 mm. high, its bracts linear-lanceolate, acuminate, 1–1.5 mm. wide, shorter than the white barbellate pappus ; rays 8–10 mm. long ; achenes linear, striate, 2.5 mm. long, 0.5 mm. thick.

Type specimens in herbarium of the New York Botanical Garden.

ROSELLINIA OVALIS (ELL.) SACC.

By William A. Riley

Mr. Ellis has described * under the name *Sphaeria ovalis*, a pyrenomycete occurring on *Artemisia* in Utah. Specimens were issued as No. 896 of N. A. F. A careful comparison of these with specimens of *Rosellinia pulveracea* (Ehr.) shows no essential differences and has led me to question the validity of the species.

In North American Pyrenomycetes, Mr. Ellis says regarding the new species: "Closely allied to *R. pulveracea*, differing principally in its perithecia." A careful study of the two species reveals individual perithecia of each which correspond perfectly. Those of *R. pulveracea* are in some cases subovate, while, on the other hand, those of *R. ovalis* are sometimes subglobose. Even in the descriptions there is not brought out any marked distinction. As an aid to comparison, I tabulate Ellis's descriptions of the two species:

Rosellinia ovalis (Ell.) Sacc.	*Rosellinia pulveracea* (Ehr.) Fckl.
1. Perithecia gregarious or subcaespitose.	1. Perithecia densely gregarious, often forming continuous crustaceous layer and *sometimes scattered.*
2. Ovate.	2. Ovate-globose.
3. Rough.	3. Minutely tubercular-roughened.
4. 250–300 μ in diameter.	4. One-third mm. in diameter.
5. Ostiolum obtusely papilliform.	5. Ostiolum papilliform.
6. Asci cylindrical, 60–65 $\mu \times$ 6 μ.	6. Asci cylindrical 60–70 $\mu \times$ 10–12 μ.
7. Stipe 15–20 μ.	7. Stipe 20–30 μ.
8. Spores short-elliptical to oblong, 8–12 $\mu \times$ 5–7 μ.	8. Spores elliptical, 8–15 $\mu \times$ 6–9 μ.

The above table shows some little distinction in size of asci

* Bull. Torr. Club, 8: 125. 1881.

and spores. The unimportance of these characters, unless very marked, is quite generally recognized by workers on this group and has been frequently emphasized. An instance is afforded by a series of measurements of asci and spores of *R. pulveracea* from the various exsiccati. In these Mr. Ellis found a variation from 60–70 $\mu \times$ 8–10 μ in asci and from 6–8 $\mu \times$ 5–6 μ to 10–12 $\mu \times$ 7–9 μ in spores. My measurements of the same species show a variation from 70 $\times$ 7 μ to 90 $\times$ 13 μ in asci; from 10 $\times$ 7 μ to 15 $\times$ 10 μ in spores. For *R. ovalis*, Ellis's measurements, as seen above, are 60–65 $\mu \times$ 6 μ for asci; 8–12 $\mu \times$ 5–7 μ for spores. I find asci as large as 85 $\times$ 7 μ, spores 10–12 $\mu \times$ 6–7 μ. From a comparison of these figures it may be seen that on the basis of asci and spores we cannot even approximate a separation of the two species. It is my belief that *Rosellinia ovalis* (Ell.) is, at most, but a variety of *R. pulveracea* (Ehr.).

It should be noted that Saccardo attributes this species to New Jersey, whereas, it has so far been reported only from Utah. Misled by the statement "on sage-brush" he doubtfully refers to the host as *Salvia*.

BOTANICAL DEPARTMENT, CORNELL UNIVERSITY.

NEWS ITEMS

The sixth annual winter meeting of the Vermont Botanical Club was held in Burlington, on January 25th and 26th. Fourteen papers were presented.

"*The Gamophyllous*, a monthly magazine devoted to plant life in field, forest and garden," is the title of a recently established periodical. It is edited and published by Mr. Harry A. Bird of Plainfield, New Jersey.

An interesting paper entitled "An Ecological Study of the New Jersey Strand Flora," by Dr. John W. Harshberger was issued on December 31, 1900. It is extracted from the Proceedings of the Academy of Natural Sciences of Philadelphia.

Dr. David Griffiths, who received his advanced degree from

Columbia University last June, is now botanist of the Agricultural Experiment Station at Tucson, Arizona. His doctorate thesis, an important paper on the North American Sordariaceae is in press.

The appearance of "A Practical Text-Book of Plant Physiology," by Dr. D. T. MacDougal is announced for May 1st. The book will be suitable for use in the laboratory, will comprise about 350 pages with 150 illustrations, and will be published by Longmans, Green and Company.

Dr. Timothy Field Allen has donated his collection of Characeae to the New York Botanical Garden. The collection represents the accumulations of many years of active interest in this group of plants. It is rich in types and co-types and is doubtless one of the largest collections of Characeae in existence.

"Mosses with a Hand Lens," an introduction to the study of mosses, by A. J. Grout, Ph.D., of the Boys' High School, Brooklyn, is an attractive booklet of 73 pages, issued in December last. It contains descriptions of one hundred of the commoner and more conspicuous mosses in but slightly technical terms, with numerous illustrations.

"The Outline of the Course in Biology" in the Horace Mann School, by Professor F. E. Lloyd and Mr. Maurice A. Bigelow, has recently appeared as Vol. II., No. 1 of the Teachers College Record. The pamphlet contains the detailed outline of the course in botany and zoölogy and will be of interest to teachers of those subjects in high schools.

Mr. J. E. Kirkwood has accepted a position in Syracuse University, where he will take charge of the Department of Botany. Mr. Kirkwood is a graduate of Pacific University, Forest Grove, Oregon. He received the appointment of special Fellow in Biology, Princeton University, for the year 1898–99, on the completion of which he continued his studies at the New York Botanical Garden and Columbia University. His special work has been on the embryology of the Cucurbitaceae and on the food content and digestion in the coconut during germination.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 27, published in 1900, contained 678 pages of text and 33 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–27 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and No. 1, Part 1, of Vol. 8, has been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

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BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

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Vol. 1 No. 4

TORREYA

April, 1901

NOTES ON THE BOLETI OF WEST VIRGINIA

By Henry C. Beardslee

Brookside, West Virginia, is situated in the heart of a mountainous region at an altitude of 3,100 feet. Its surface is much varied and presents all the conditions for an abundant fungus flora, which it was the writer's good fortune to study during the past summer.

Many of the species observed were of great interest to a northern botanist; the Boleti, especially, presenting many forms which are either rare or unknown to our own State of Ohio. In all, nearly forty species were observed. Many of these were common and well known to all students of the group. Some, however, were comparatively rare, and the following notes in regard to them have been collated, as of possible interest to students in other regions.

Boletus auriflammeus B. & C. was one of the first species of interest to be observed. Like all the Pulverulenti, it is very rare, but as all three of our species were originally discovered in the Carolinas, it was with more of pleasure than surprise that it was observed in West Virginia. It grew by preference in dry gravel high on the mountain-sides, and was remarkably arid, being less perishable than any other species observed. It is a small plant, bright golden yellow in color, and thickly covered with a yellow powder, which disappears with age. This powder in the younger plant colors the mouths of the tubes, giving them a distinct orange tint, which contrasts plainly with the remainder of the tubes.

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This would seem to explain the reference, in the original description, to the scarlet mouths of the angular tubes, which certainly does not otherwise apply to our plant.

Boletus Ravenelii B. & C., another member of the Pulverulenti, was rather more common than the preceding species and almost as striking. It was frequently found with its large fluffy veil intact, and thickly covered with its sepia-brown spores. Its slender flexuous stipe was a marked characteristic of the form at Brookside.

Boletus cyanescens Bull. has been considered a northern species, but it was not rare along the mountain roads. The first specimen observed was just emerging from the bare soil on the roadside. Its yellow tomentum was so characteristic and its appearance so distinct that it was visited daily as it slowly developed, though with no suspicion of its identity. It was afterward found fairly abundant, but always in the clay-banks, along the roads, with which its grayish yellow color harmonized perfectly.

Among the rosy spored species *Boletus alutarius* Fr. and *Boletus nigrellus* Pk. were the most interesting, and *Boletus gracilis* Pk. the most abundant.

Boletus nigrellus Pk. was observed in all its stages and differed so widely from the original description, that it seemed at first distinct. It was at first "blackish" in color, but soon changed to a sordid gray. Its flesh, however, was decidedly not "white and unchangeable," as the entire plant, when handled or bruised, blackened rapidly, the dried specimens being inky black. Professor Peck, who has examined my specimens, pronounces them identical with his species, so that it is evident that the original description must be modified.

Boletus alutarius Fr. grew all summer in turf beneath the same chestnut tree, where it was kept under observation. It is an attractive plant, unlike any of its relatives. In its earlier stages it has a distinct pubescence, but it becomes quite smooth with age.

Peck's two fine species, *Boletus separans* and *Boletus eximius*, were generally distributed on the hillsides, but neither was common. *Boletus eximius* Pk. fell far below the huge dimensions of this species as we have found it in Maine.

Boletus edulis Bull., to our great surprise, was scarcely seen all summer. *Boletus affinis* Pk. was abundant everywhere.

The two species which were most abundant were *Boletus chromapes* Frost and *Boletus bicolor* Pk. The latter species was particularly common along the sandy roads, where its dark red pilei might be seen often in large clumps attracting the eye of every passer-by.

CLEVELAND, OHIO.

REMARKS ON THE USE OF FUNARIA HYGROMETRICA IN BOTANICAL TEACHING

BY MARSHALL A. HOWE

The common cord-moss (*Funaria hygrometrica*) figures so prominently in well-known botanical text-books that little or nothing needs to be said as to the characters by which it may be recognized. It may be remarked, however, that this moss grows by preference on moist sandy soil in either open or lightly shaded places and that it thrives with special luxuriance where such soil has been recently burned over. Though the leaves of the living *Funaria* have long been famed for the beauty and clearness with which their chloroplasts are exhibited, the gametophyte, on account of the shortness of the stem, is perhaps not so well adapted for general study in the laboratory as is that of some of the larger mosses like the Mniums. Yet, for spring classes, *Funaria* may be relied upon to furnish material for the demonstration of living spermatozoids. The clusters of antheridia may be recognized in the living plants with the naked eye or with the aid of a hand lens. They are of a yellowish or brownish color owing to changes in the chloroplasts of the cells composing the walls of the maturing antheridia, and each cluster is surrounded by leaves in such a way that the whole is rosette-like in form. In the region of New York, the antheridia are mature late in April or early in May. As in dealing with fern prothalli, the spermatozoids are set free with greater certainty if the plants are kept rather dry for a day or two before the antheridia are brought into a drop of water for examination.

But certain characters of the sporophyte, notably the beauty of the peristome and the ease with which it may be made to illustrate the hygroscopic nature of moss peristomes in general, are what especially commend *Funaria* for use in botanical instruction. It is, I believe, a sound principle in the pedagogics of natural history to select illustrative material now and then which is bound to excite the interest and admiration of the most indifferent pupil. It can be readily understood that in its abuse this motive might lead to a selection which would interfere with a proper perspective of the subject as a whole, but, in the present case, the features in which the peristome of *Funaria* differs from the type most common in the mosses are of little importance to the general student.

For the best demonstration of the workings of the peristome, the plants should be collected and dried when the capsules are mature and brown and a little before the opercula are ready to fall, which, in the neighborhood of New York, is mostly in June and July. In this dried condition, they may be preserved indefinitely. When the study of the matured sporophytes is begun, some of them, still attached to the gametophytes, may be placed in a glass of water and the student's attention directed to the untwisting of the seta as it absorbs the water. Then, on holding one of them in the air a few moments, the seta is seen to twist again. These movements of the seta under changing conditions of moisture were, with little doubt, what suggested the specific name *hygrometrica* to Linnaeus. Finally, the probable relation of these movements to the dispersal of the spores may be suggested to the student if he fails to think of it himself. The amount of soaking required to remove the operculum depends largely on the degree of maturity of the capsule at the time of gathering. The act of throwing off the operculum and the relation of the annulus to the process can best be observed if a few capsules are placed in a large drop of water on a glass slide or in a shallow watch-glass. After the removal of the operculum and annulus, the capsule may be allowed to dry and if it can then be balanced on its back with the mouth directed upward, the peristome as a whole may be examined to advantage by reflected light under the ordinary lower powers of the compound microscope.

If the peristome is in a normal condition, it will be found to be extremely sensitive to changes in moisture, responding perhaps to the ordinary breathing of the observer or at least to a gentle blowing. As in mosses in general, the teeth draw inward and close together on absorbing moisture and execute the reverse movements on drying. The equilibrium of a capsule balanced in the manner described is unstable at best, but it can be easily rendered stable and permanent by the use of various adhesives. Professor Francis E. Lloyd suggested to the writer the use of paraffin for this purpose and this has proved a convenient medium. A very small quantity of paraffin is melted on a glass slide and the capsule is placed in contact with it and held in position, mouth upward, until the paraffin hardens. Preparations made in this way may be laid aside for future use. The matured capsule, peristome, annulus, etc., may of course be subjected to further study in the usual manner, not neglecting the important fact of the presence of stomata, which may be found near the base of the capsule.

Formalin-preserved material of *Funaria* with young sporophytes is valuable, among other things, for demonstrating the structural independence of gametophyte and sporophyte. With the right kind of a pull, the young sporophyte may often be separated from the gametophyte in such a way that a microscopical examination of its foot will show that the act was accompanied by no rupture of cells. But for this special purpose *Funaria* is perhaps no better than many other mosses.

SHORTER NOTES

A NEW HAWKWEED FROM FLORIDA.—Contained in an interesting collection of plants made in the vicinity of Tallahassee, Florida, by Mr. N. K. Berg, and received from him several years ago by Dr. Small, is a single well-preserved specimen of a hawkweed which differs widely from any species known to me, and I can find no plant described which answers to its peculiar characters. In a genus of so many species, and these so very widely distributed there is chance that this plant may have been recorded

by some previous author, but this chance is not very great, for the North American species have been considerably studied, and doubtless most of the forms deserving recognition as species are fairly well understood. The plant may be characterized as follows:

Hieracium Floridanum. — Stem tall, stout, villous-hirsute below the middle, over 1 m. high, paniculately branched above the middle, the branches slender, erect-ascending ; no basal leaves at flowering time : stem leaves broadly oval to elliptic or ovate-oval, firm, the lower 9 cm. long, 4–5 cm. wide, rounded at the apex, subcordate-clasping at the base, loosely villous-hirsute on both sides, entire, with numerous minute glands on the margins, the upper leaves gradually smaller, the uppermost acute : panicle 6 dm. long or more, naked, ample, its branchlets glandular ; heads very numerous, 20–25-flowered ; involucre 8 mm. high, its principal bracts in one series, linear, acutish, glandular, the much shorter outer ones triangular-lanceolate, acuminate or acute : achenes columnar, 4 mm. long, truncate, slightly narrowed above, a little shorter than the brown pappus.

The sessile half-clasping leaves extend down the stem to the fourth node above the mass of fibrous roots. They are very numerous and the internodes not over 2 cm. long. From the character of the achenes the species is apparently more nearly related to *H. Marianum* than to any other North American plant. —N. L. Britton.

A new Arnica from Oregon.—**Arnica aurantiaca.** Subalpine, low, forming dense patches, the simple monocephalous stems 2–6 inches high from horizontal rootstocks : leaves in about 3 pairs, the lowest broadly oblong, obtuse, the others broadly lanceolate, attenuate-acute, all entire, glabrous or nearly so, except the woolly-ciliate margin : slender peduncle sparingly woolly-hairy and minutely glandular : involucre broadly turbinate, its thin lanceolate bracts about 10, scarcely biserial, narrowly lanceolate, woolly at base, the margins obscurely glandular-ciliolate : flowers both of ray and disk orange-color : achenes silky-villous : pappus white, barbellulate.

At the head of Keystone Creek, Wallowa Mountains, Oregon, at about 7,000 feet, Aug., 1900, W. C. Cusick. A small subalpine species, uncommonly well marked by its deeply colored flowers, and silky achenes.

Arnica crocina is a name to be assigned the *A. crocea* of Pittonia, 4 : 159, in view of the fact that the Linnaean name of

what has since been transferred to *Gerbera* was *Arnica crocea*.—EDWARD L. GREENE.

A NEW PANICULARIA.—**Panicularia Holmii.** A pale perennial 25–50 cm. high, spreading by rootstocks: leaves 4–6, scabrous; the upper ligule 5–7 mm. long; blades flat, acuminate, 4–12 cm. long, 4–7 mm. wide: panicle open, lax, 5–8 cm. long, rays in pairs, the longest 4–5 cm. long, bearing about 20 spikelets on the outer half: spikelets 2–3-flowered, joint of rachilla 0.5 mm. long; first empty glume hyaline, ovate, 1 mm. long with one obscure nerve; second, hyaline, oval, 1.3 mm. long with three obscure nerves: floret scabrid, oblong, 2–2.2 mm. long, floral glume broadly oval when spread, 5-nerved, apex subtruncate, irregularly toothed; paler while attached, extending to the apex of its glume: grain elliptical, 1 mm. long, base acute, apex truncate.

Near to *Panicularia pallida;* the blades wider, spikelets mostly 2-flowered, empty glumes shorter, floret shorter, floral glumes 5-nerved instead of 7-nerved.

Growing in a creek at a beaver-dam in dense thickets of *Salix*, near Lamb's Ranch at Long's Peak, Colorado; altitude, 8,600 feet.

No. 249. Collected by Theo. Holm, July 8, 1899, for whom it is named.—W. J. BEAL.

NATURALIZED OR ADVENTIVE NARCISSI.—Mr. C. L. Gruber writes as follows from Kutztown, Pa. "I have repeatedly found two species of *Narcissus* running wild, escaped from cultivation: *Narcissus Pseudo-Narcissus* (daffodil) and *Narcissus poeticus*. *Pseudo-Narcissus* I have found at a number of places, usually on warm slopes of meadows, in the vicinity of gardens; and *N. poeticus* I have found in meadows, unused portions of cemeteries and on one occasion in an orchard adjoining a garden."

REVIEWS

MYCOPHAGY AND ITS LITERATURE

Some five years ago an extensive interest began to be displayed in this country toward the subject of edible fungi. It is probable that a part at least of this interest was stimulated

through the influence of William Hamilton Gibson's popular articles and illustrated work,* and the interest was increased by the publication of the special edition of the report of the State Botanist of New York for 1894 † with numerous colored plates of edible and poisonous fungi. It was thought that the fad would soon die out, but, instead, the mycological clubs seem to be growing larger and the interest in their gatherings does not appear to show any signs of abating. It was further hoped that this widespread interest in this neglected group of plants would stimulate some to take up a scientific study of the fleshy fungi, but while a very few have made slight contributions, the many desiring entertainment rather than severe study, have contented themselves to remain mere mycophagists instead of taking mycology too seriously. To appeal to this latter class of readers, four works have recently appeared. That they all appeal to eye and stomach as well as brain is evidenced by their profuse illustration, their chapters on how to cook the delectable mushroom, as well as by their assumption of scientific or pseudo-scientific diagnoses.

Of these books, two may be quickly dismissed. The modest little work of Misses Dallas and Burgin ‡ purports mainly to give the beginner in the study of the larger fungi the results of the recent field experiences of its authors. The ponderous volume by McIlvaine §, while it will doubtless prove the most useful of the entire series because of its covering a much wider range of descriptions of species than any of the others and freely quotes descriptive matter from original sources, is more or less uncertain and unreliable because one is often left in doubt where the quota-

* GIBSON. Our edible Toadstools and Mushrooms and how to distinguish them. 8vo. New York, 1895.

† PECK. Annual Report of the State Botanist for 1894. 4to. Albany, 1897.

‡ DALLAS & BURGIN. Among the Mushrooms. 7.5 × 5 × 0.875 in. Pp. xi + 175. With 11 full-page plates, two colored, the others half-tones. Weight 15 oz. Drexel Biddle, Philadelphia. 1900. Price, $1.50.

§ MCILVAINE. One thousand American Fungi. How to select and cook the Edible; how to distinguish and avoid the Poisonous. 11.25 × 8.25 × 3.5 in. Pp. xxxvii + 704. Illustrated with 193 "plates" of which 128 are simple text figures, thirty are full-page diagrams or half-tones and thirty five are colored. Weight, 122.5 oz.—about that of a Winchester repeating rifle. Bowen-Merrill Co., Indianapolis. 1900. Price, $10.00.

tions end and the less reliable remarks of the author commence. As a work intended for practical use it is a clumsy product of the bookmaker's art * as wretchedly adapted to its purposes as any botanical work that the past century produced.

The other two works however are the ones between which the mycophagic public will be more likely to choose, for at this public it is evident that their respective authors have clearly aimed. Of the two, Professor Atkinson's work † is more technical, for it is not easy for the professional botanist to lay aside the technicalities of his office in appealing to a popular audience. Yet a mixture of too technical science and recipes for cooking jars one's sensibilities of congruity, seeming to bring the kitchen in too close proximity to the laboratory. The work is admirably illustrated with photographs in half-tone and seven colored plates. The cover ill accords with the contents and the paper used is of the glossy clay-covered form so common in our time, which serves to bring out the half tones well, but ill comports with fine bookmaking and lessens the prospect of durability. The descriptions are very complete and accurate, giving details that were evidently drawn from long and close acquaintance with the specimens in their native haunts.

The work by Miss Marshall ‡ is a practical well-written text shorn, as far as possible, of technicalities, prepared to accompany reproductions of what are without question the finest series of fungus photographs that have been produced. These were made by Mr. J. A. Anderson, of Lambertville, New Jersey, and colored

* In quoting titles of books hitherto it has usually been sufficient to mention the superficial area of the cover. As these works ought to be such that they can be used afield, it is thought desirable to add the third dimension so that bulk may be computed, as well as the important consideration of weight.

†ATKINSON. Studies of American Fungi. Mushrooms, edible, poisonous, etc. 10 × 6.5 × 1 in. Pp. vi + 275. Illustrated with 223 figures, 76 of them full-page plates, seven colored. Weight, 38.5 oz. Andrus & Church, Ithaca. 1900. Price, $3.00. Reviews of this book by its own author appear in *Science*, 23 N. 1900, and in *Popular Science Monthly*, F. 1901.

‡MARSHALL. The Mushroom Book. A popular Guide to the Identification and Study of our commoner Fungi with special Emphasis on the edible Varieties. 11 × 8 × 1.25 in. Pp. xxvi + 167. Illustrated with forty eight full-page plates, twenty four of them in colors, and numerous text illustrations. Weight, 42 oz. Doubleday, Page & Co., New York. 1901. Price, $3.00.

by his daughter, Miss H. C. Anderson. Twenty four of these have been reproduced in color, none of which equal the superb originals, though a few, like those of *Amanita muscaria*, *Pholiota adiposa*, *Boletinus pictus*, and *Phallus*, approach them. Others like *Tricholoma personatum* and *Clavaria formosa* are too highly colored and the defective reproduction of backgrounds in some cases detracts from the good illustration of the fungus itself. The work makes no claim to be coldly scientific but depends for its technical descriptions on those who have originally made them. As a piece of artistic bookmaking the Mushroom Book shows superior workmanship. Fine quality of paper, excellent printing, and plain but effective cover make the work attractive externally and internally, while its clear and simple text is not aimed above the heads of the audience to which it primarily appeals.

In both works are occasional slips of the pen and verbal inaccuracies which future editions will doubtless correct. Through both it becomes clearly evident that the camera is the scientific instrument by which we must attack the problem of bringing to the laboratory the characters of the perishable fleshy fungi.

But after all that is said, for the practical purpose for which these books are intended, namely the enlightening of unscientific people as to what are edible and what are poisonous fungi, none of the American books yet touch the standard * set by the Germans at half the price, where in place of attempts to force science on unscientific minds, in place of heavy books adapted best for library tables, we have fifty-six colored plates (nearly all of which are of species as common in America as in Europe) put up in a form adapted for the pocket and for work afield, with plain descriptions of the fungi one is sure to meet with in the field and forest, and with no entanglements of rare or new species or elaborate keys and array of technicalities; for after all the mycophagist must learn edible fungi as he learns garden vegetables—by sight —and then eat them by faith !—LUCIEN M. UNDERWOOD.

* MICHAEL. Führer für Pilzfreunde. 8.25 × 5.5 × 0.5 in. Pp. xi+31. With 56 colored plates with descriptive text opposite each for ready reference. Weight, 11 oz. Zwickau, 1897. Price, 6 marks ($1.50).

CORRESPONDENCE

"A SIMPLE DYNAMOMETER"

In the first number of TORREYA, Dr. H. M. Richards describes briefly "a very simple machine for registering approximately the amount of energy involved" in imbibition.* Passing over the terms here used (to which the physicist would take serious exception), it is obvious that the force of imbibition cannot be measured by the arrangement described. Dr. Richards has apparently confused the *force* of imbibition with the *extent* of swelling. The attraction in virtue of which water is imbibed, being probably molecular or analogous thereto, is not dependent on the number of organized structures (such as cell-walls) involved, but the extent of the swelling is. The scale in the arrangement suggested registers not force but *distance in terms of weight.* To illustrate: If the bottle contained only one layer of peas the scale might register a quarter of an ounce, since the distance through which the pan would be depressed might equal the depression which that weight would cause in the particular spring used (a weak one). If the bottle were nearly filled, however, and the peas did not jam but moved freely upward as they swelled, the scale might register half a pound. Yet the actual force of imbibition in the two cases would be exactly the same, and vastly greater than either registration. Evidently also the result would be wholly different with a very strong spring, an equal depression corresponding perhaps to 100 lbs.

The same objection would lie against the use of the scale for measuring the force exerted in growth.

It may be worth while, further, to call attention to the fact that a like error inheres in all methods of measuring the force of root-pressure in decapitated plants when a large open tube is used as a manometer.† To a less extent this objection applies also to open mercury manometers.—C. R. BARNES, *University of Chicago.*

* Richards, H. M. A simple Dynamometer. Torreya, 1 : 8. Ja. 1901.

† Atkinson. Elem. Bot. 32, and Lessons in Botany, 51. Here, regarding a device recommended by Detmer merely to demonstrate the outflow of sap, it is said, "The height of this column of water is a measure of the force exerted by the roots."

"A SIMPLE DYNAMOMETER"

In reply to the above criticism by Professor Barnes the undersigned would say that it was not his intention that anyone should interpret the method described as a way to estimate the total imbibition force in all directions: but it is hardly possible, of course, to make an experiment absolutely safe against misunderstanding. The apparatus described by MacDougal* is about the only one which will adequately represent this force. In this method enough seeds are used so that the total thrust of expansion is delivered within the range of the manometer. With proper precautions however the apparatus described as "a simple dynamometer" may be made use of for a comparative study of the force of imbibition in one—the vertical direction. The precaution is a simple one, namely that the scale be not overloaded, or in other words that the amount of material used be coördinated with strength of the spring. In common with other apparatus of this type the critical point at which overloading begins can only be determined by empirical experimentation.

The same objections as those brought forward by Professor Barnes could also be made to Pfeffer's spring dynamometer† or indeed to the common lever dynamometer if the same precaution is neglected. The apparatus described by Detmer‡ is in effect much the same, and the results obtained by it could also be rendered of small import if a two gram instead of a two hundred gram weight were used on the platform.

It should indeed have been stated that it was a "2 lb." letter scale which was used. The weaker scales might serve for indicating force exerted by the downward growth of certain roots; ones in other words which were adapted to the strength of the spring within the scale.—HERBERT M. RICHARDS, *Barnard College.*

* Journ. N. Y. Bot. Gard. 2: 39. Mr. 1901.

†Druck und Arbeitsleistung durch wachsende Pflanzen p. 18 et seq. Leipzig. 1893.

‡ Practical Plant Physiology (translation), 142.

OTHER PUBLICATIONS

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TORREYA

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"WHEN IN ROME DO AS THE ROMANS DO"

By P. A. Rydberg

Professor E. L. Greene has lately published a very interesting article in the *Catholic University Bulletin* under the title, "Some Literary Aspects of American Botany" in which he criticizes especially the forms of titles used by botanical authors in America. I intend here to point out some misuses in naming plants. If, in attempting to do this, I should myself make some blunders, I trust they may be pardoned and corrected by some more competent critic.*

The old proverb, "When in Rome do as the Romans do," may well be applied to the use of Latin in botanical descriptions and terms. In other words, when we use the Latin language in science we should always try to use it as a Roman would have done. Latin descriptions such as two which were published in one of our leading botanical journals a few years ago † bring discredit to the author as well as to the journal that prints them.

This time I shall, however, dwell only upon specific names given in the honor of some person. Two methods have been used by biologists, viz., the Latin genitive form of the proper noun and an adjective formed from the same by appending *-anus, -ana, -anum.* Many botanists have agreed to use the former when the person in whose honor the plant is to be named has discovered it, described it or done any other work in connection

* Even the best may make mistakes sometimes, as was illustrated in the article cited above, where Professor Greene misquoted a title he criticized. On page 153 appears "Contributions to the Comparative Histology of Pulvini and the Resulting Pholeolitic Movements," and on page 157, "Pholiotic Movements" instead of "* * * Photeolic Movements" as it reads in the original.

† Bot. Gaz. **26**: 268, 269. 1898.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 5, comprising pages 49–60, was issued May 22, 1901.]

with it, and the latter when the author wishes to honor some friend without the latter being otherwise connected with the plant. The acceptance of this distinction is far from universal, however.

If a friend happens to discover an undescribed species and one wishes to name it after him, it is important to know how to give his name in a proper Latin form. The Berlin botanists have adopted the following rules: If the name ends in a consonant other than *r*, add *-ii* to the name, but if the name ends in a vowel or *r*, add *-i.** We therefore say *Carex Bicknellii*, but *C. Torreyi* and *C. Fraseri*. The only exception to these rules admitted by the Berlin botanists is in case the name ends in *a*, when it follows the first declension with *-ae* in the genitive, as for instance *Physalis Lagascae*, named after the Spanish botanist Lagasca.

The adding of *-ii* or *-i* to the proper name of any barbarian language has not come down to us from the classic Latin; for the old Romans latinized names in many different ways, and if they could not give it a good Latin form, they adopted it as it was and made it indeclinable. The custom mentioned comes to us from the middle ages, when Latin was the language of the learned and every learned man must have a Latin name. Most of them formed this by adding *-ius* or *-us* to the name, so that Des Cartes became *Cartesius*, Rudbeck, *Rudbeckius*, and Ray, *Raius*; others, however, translated their names, as for instance Bock, who called himself *Tragus*.

The adding of *-ius* and *-us* in the nominative and *-ii* and *-i* in the genitive is good, as a rule, whenever the name is not already in good Latin form. It would never occur to a Roman to write *Lagascai* as the genitive of Lagasca, and the Berlin botanists have seen it in that light, but would it not be as ludicrous in the eyes of a Roman to see the genitive of Magnus written *Magnusii?* And still the Berlinese cite this as the proper form. Names such as Retzius, Hieronymus, Wislizenus, etc., have a good Latin nominative form (*Hieronymus* was used in old Latin), and no ending needs to be added. It would be worse than grammar school Latin to write in the genitive *Retziusii*, *Hieronymusii* and *Wislizenusii*. American botanists have, in general, refrained from such forms. The only name that in America has been treated

* If the friend were a lady, *-iae* and *-ae* should then be substituted, respectively.

somewhat in the Berlin fashion, is that of a German, Mr. Purpus, in whose honor *Eriogonum Purpusi*, etc., have been named; but the Americans have satisfied themselves with only one *-i* at the end.

The use of *-i* instead of *-ii* even after a consonant has been very common in this country. Watson, for instance, almost always used one *-i*. Plants named after Dr. Chapman are nearly always *Chapmani* (one *-i*) and there are perhaps ten species named *Engelmanni* (one *-i*) to one called *Engelmannii* (two *-i*'s). In the mediaeval Latin names ending in *-mann* were written with the ending *-mannus*, without an *i*. The genitive therefore had only one *-i*. Whether we should keep up this tradition or not is a matter of taste. We have no precedent in classical Latin to follow. There are cases, however, where a consonant should be followed by only one *-i* as in *Bernhardi*, *Gerardi*, etc., as Bernhard and Gerard have old Latin forms in *-us*, *Bernhardus*, *Gerardus*. In the same way, I think, we should write *Richardi*, *Howardi*, *Havardi*, *Bongardi*, etc., all with one *-i*.

Names ending in *r* take according to the Berlin rule one *-i*. This is not because *r* is a semivowel and the nominative therefore should end in *-us* instead of *-ius*, but simply because those ending in *-er* have as they stand a Latin nominative ending, and the Berlinese let the few ending in *-ar*, *-ir*, *-or*, *-ur* follow the same rule. An old Roman would never have done this. The latter names should follow the third declension, like the Latin words, *nectar*, *victor*, *robur*, *vultur*, etc. Fendler, Berlandier, Fraser, Heller, Carpenter, Porter, etc., being in good Latin form as they stand, follow the second declension regularly, with *Fendleri*, *Berlandieri*, etc., in the genitive; but Bolivar, Victor, Arthur and Muir should have the genitives *Bolivaris*, *Victoris*, *Arthuris* and *Muiris*, unless the last may be regarded as an exception and follow the declension of *vir* (*-i*).

According to the Berlin rules, names ending in a vowel (except *a*) should take one *-i*. Those ending in *-a*, follow the first declension. Why should not those ending in *-o* follow the third? All foreign words ending in *-o*, taken into Latin, followed the third declension; and this was not only the case with Greek words, but also those from the Phoenician, the Egyptian and

other barbaric tongues. Why should we not follow the same custom in botanical names? Ledebour wrote *Claytonia Chamissoi;* but Eschscholtz had before him in manuscript, *C. Chamissonis.* Many of the later botanists have used the proper form. We have, therefore, *Aquilegia Ottonis, Cyperus Ottonis, Lupinus Chamissonis, Viburnum Demetrionis, Sullivantia Ohionis.* These forms are much more common and of course far better than such as *Astragalus Serenoi.*

But if names ending in *-o* should follow the third declension, then should also those ending in *-on.* Here, however, botanists have seldom tried to follow Latin customs. We find both *Brittoni, Eatoni,* etc., and *Brittonii, Eatonii;* but not *Brittonis, Eatonis,* etc., which would be better. Besides myself, who have used *Wootonis* and *Congdonis* as specific names, I think no American botanist has used a genitive in *-onis,* in naming a plant in honor of a person whose name ends in *-on.* I know of one case in which such a genitive was used, but the plant was not named after a person. I refer to *Astragalus Zionis* Jones.

A German may claim that Anton has the Latin form *Antonius,* which follows the second declension with *-ii* in the genitive; but we must remember that Anton is a German and Scandinavian form and that the name is written in French Antoine and in English Anthony, while most of the names ending in *-on* are French or English, and in the latter case derived from the Norman-French or formed under its influence. The majority of modern French words ending in *-on* came from Latin words ending in *-o* or *-on,* both with *-onis* in the genitive. I think, therefore, that all names ending in *-on,* at least those belonging to any of the Romance languages or derived from them, should follow the third declension.

The extension of this rule to names ending in *-son,* as Anderson, Nelson, etc., is perhaps of doubtful propriety. These are all of Scandinavian origin and have a peculiar history. In Sweden they have never, until in later years, been regarded or treated as family names. Peterson meant Peter's son and nothing more. If Peter Anderson had a son by the name of John, he would be known not as John Anderson, but as John Peterson; and John's son Nels would be Nels Johnson. From the middle ages to the

later part of the eighteenth century, these names were often written in Latin. The first Protestant Archbishop of Sweden was Lars Peterson, who usually wrote his name *Laurentius Petri* (the word *filius* being understood). In Swedish history we read both of *Olaus Magnus* (Big Olof, so called for his size) and *Olaus Magni* (Olof Magnuson). In the genitive both names would be *Olai Magni*. The old way of writing Johnson, Anderson, Larson, etc., could scarcely be used in botanical names, as it would cause much confusion, and the names would scarcely be recognizable. The three above mentioned would be respectively, *Johannis*, *Andreae*, and *Laurentii*. If a Roman had seen Anderson written, without knowing the meaning or derivation, he would very likely have written the genitive as *Andersonis*. He might perhaps have given it the Latin form *Andersonius* (*-ii*); but never as many of our botanists do, *Andersonus* (*-i*).

If a Roman had seen the name Ames, he would probably have written it in the genitive *Amis*, according to the third declension. It is perhaps safer to latinize such names and write *Amesius* (*-ii*), in the same way as Des Cartes became *Cartesius* (*-ii*).

From the foregoing it would appear that the Berlin rules must be modified in order to accord with good Latin usage, and that the latinizing of proper nouns is a matter that needs the attention of a botanical congress.

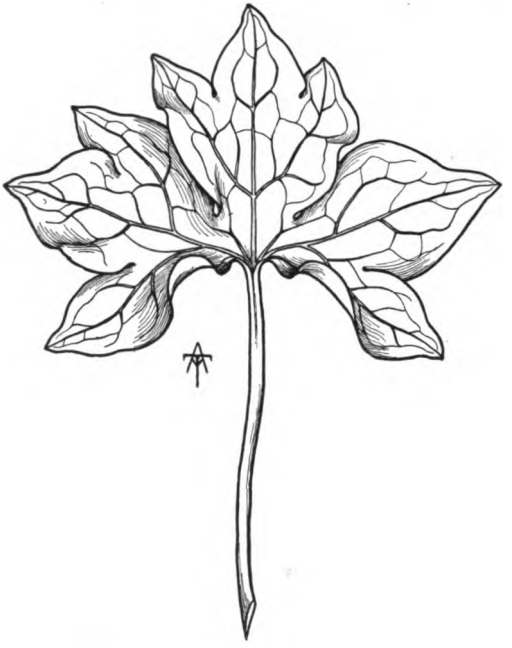
HETEROPHYLLY IN HEPATICA ACUTA

By S. H. Burnham

A few years ago, while collecting in an old rich wood near Vaughns, Washington County, New York, I found several plants of an interesting acute-leaved Hepatica, and transplanted a single plant in my wild garden, where the leaves have remained constantly seven- to nine-lobed. The normal form has leaves with three acute lobes, sometimes passing into *Hepatica Hepatica* (L.) Karst., with which it sometimes grows, though it usually blooms a week earlier in northern New York. Often, leaves are five-lobed; but rarely is the lobing carried so far as in the above plants.

In the Bulletin of the Torrey Botanical Club, 8: 36. 1881, is a note with illustration of a leaf of the round-lobed Hepatica with seven lobes, which was exhibited by Mr. Gerard at a meeting of the Club. He says all the leaves of the plant possessed the same peculiarity, "the middle lobe being deeply trilobate and the lateral ones bilobate, thus making an approach toward the leaf forms found in the genus *Anemone*."

Professor W. R. Dudley, in his Cayuga Flora, alludes to "forms with five- and even seven-lobed leaves in rich shaded soil at Big



Gully, etc." In the Columbia Herbarium is a specimen from Lookout Mountain, Tenn., with eight-lobed leaves, collected by Dr. A. W. Chapman. There is also a specimen from northern New Jersey, at State Line, collected by Dr. N. L. Britton, June 6, 1885, with five- to seven-lobed leaves.

Thanks are due to Miss Alexandrina Taylor for the care with which she has drawn one of the beautiful leaves of the Washington County plant.

AN ALLEGHANIAN RUDBECKIA

By John K. Small

While on excursions into various portions of the southern Alleghanies and the Blue Ridge, I have quite frequently met with a very characteristic *Rudbeckia*. It occurs more frequently at altitudes between 1000 and 1600 meters, although sometimes it may be found at elevations a little lower or considerably higher than those just indicated. As far as its biological distribution is concerned, it is mainly confined to the Alleghanian life-zone and thrives best in such localities as are inhabited by *Solidago monticola*, *Gaylussacia ursina* and *Vaccinium pallidum*. So far as I can learn, this species has never been described, but may now be characterized as follows:

Rudbeckia monticola

Perennial by short horizontal or oblique rootstocks. Foliage hirsute or hirsute-hispid: stems 3–11 dm. tall, sometimes tufted, normally simple, occasionally branched above: leaves few; blades oblong, elliptical, oval or ovate, 5–10 cm. long, sharply serrate, sometimes shallowly so, those of the basal and lower stem-leaves with winged petioles or petiole-like bases, those of the upper stem-leaves sessile and usually partly clasping by their broad bases: bracts of the involucre linear to linear-lanceolate, 1–1.5 cm. long, bristly hirsute, reflexed: ray-flowers several; ligules bright yellow, 2–3.5 cm. long: disk hemispheric to ovoid, 12–18 mm. broad, dark purple-brown to almost black at maturity: bractlets acute, ciliate near the slightly broadened tips: disk-corollas 3–3.5 mm. long: achenes 2.5 mm. long, slightly enlarged upward, finely longitudinally ribbed and very minutely pitted.

In woods, West Virginia to North Carolina, Georgia, Tennessee and Alabama. Summer.

Rudbeckia monticola is related to *R. hirta* from which it may easily be separated at sight by the sharply serrate blades of the upper stem-leaves with their broad partly clasping bases. The type is preserved in the herbarium of the New York Botanical Garden. The following cited specimens belong here:

West Virginia: White Sulphur Springs, July 16, 1892, *A. Brown.*

North Carolina: Haywood Co., July, 1885, *M. E. Hyams;* Swain Co., July 12, 1891, *Beardslee & Kofoid;* Biltmore, June 10, 1896, Biltmore Herbarium no. 852; Hendersonville, June 29, 1898, Biltmore Herbarium no. 852a.

Tennessee: White Cliff Springs, July 11, 1894, *T. H. Kearney, Jr.;* Lookout Mountain, June 28, 1897, *H. Eggert;* Wolf Creek, August, 1896, *A. Ruth*, no. 4055.

GEORGIA: Tallulah Falls, August 8, 1893, *J. K. Small;* Thomas Bald, August 9, 1893, *J. K. Small;* Estotoah Falls, August 11–12, 1893, *J. K. Small* (type); Stone Mountain, July 27, 1893, *J. K. Small.*

ALABAMA: Auburn, June 5, 1897, *Earle & Baker*, no. 276.

DIEMBRYONY IN CORN

BY BYRON D. HALSTED

In making some germination tests of corn upon a large scale a single grain was met with that showed a double embryo—one apparently normal and the other secondary. The grain in germination was lying with the embryo side downward so that the main plantlet needed to turn upward around one side of the grain making a J-shaped curve. The smaller shoot grew nearly parallel with the first one and stood close to it, although much smaller. The grain was transferred from the germinating dish to earth in a flower pot and supplied with conditions for further growth, at which time each plantlet had a main root.

After growing as long as the smaller plant would, the two were removed and a photograph taken from which the little side engraving has been made.

It is seen that one plant grew quite normally, while the other remained small and attempted to produce two ears, but without tassel, and no grains were obtained.

It only needs to be said that the case in hand was a yellow grain from an ear picked upon the College Farm and brought to me, because it was the only one of a large field that had dark, nearly cherry-colored grains mixed in almost equal numbers with

the yellow grains. It is regretted that a sketch of the two embryos was not made before the grain was placed in the earth for further growth. Out of very many thousands of germinating grains of corn, this is the only one showing diembryony that has come to my notice.

RUTGERS COLLEGE, May 4, 1901.

REVIEWS

A work that is sure to play an important part in popularizing botanical studies on the Pacific Coast is the recently published "Flora of Western Middle California" * by Dr. Willis Linn Jepson, Assistant Professor of Botany in the University of California. This is a carefully written and attractively printed descriptive manual, with keys to the families, genera, and species. In many species a considerable range of variability is recognized, especially in vegetative characters, under conditions which are definitely named. New species and varieties are described in various genera. In the matter of nomenclature, it is not wholly obvious just what considerations have determined the choice of generic names. The nomenclature is evidently not that of Berlin, Kew, Harvard, the Rochester Code, or of the Flora Franciscana. With considerable allowance for the inherent difficulties of making one's practice seem always consistent and logical to another, it may be said that Professor Jepson's selection of names has the appearance of being an arbitrary compromise between the so-called "conservative" and "reform" tendencies. The influence of the American principle of "Once a synonym, always a synonym" is doubtless to be recognized in the substitution of *Tumion* Raf. for *Torreya* Arn., *Osmaronia* Greene for *Nuttallia* T. & G., and *Xylothermia* Greene for *Pickeringia* Nutt. To the "priority of place" idea is evidently to be attributed the acceptance of *Tissa* Adans. in the place of *Buda* Adans., while simple priority of publication is apparently responsible for the adoption of *Panicularia* Fabric. for *Glyceria* R. Br., *Razoumofskya* Hoffm. for *Arceuthobium* Bieb., *Koellia* Moench for *Pycnanthemum*

*Jepson, W. L. A Flora of Western Middle California. 8vo. Pp. iv + 625. 16 Ap. 1901. Encina Publishing Co., Berkeley. Price $2.50.

Michx., *Bolelia* Raf. for *Downingia* Torr., *Ptiloria* Raf. for *Stephanomeria* Nutt., etc. In these changes from the usage of the "Botany of California," there is no suggestion of the fifty-year limit proposed by the Berlin botanists and there is little evidence of mercy toward names which, according to some writers, have become so consecrated by long usage as to be out of the reach of modern nomenclatural legislation. Yet several generic names equally vulnerable, like *Capsella* Medic., *Echinocystis* T. & G., and *Dicentra* Bernh., are retained. But these possibly await modification in the second edition, which the manifest merits and popular qualities of the work will doubtless soon make a necessity. [M. A. H.]

CORRESPONDENCE

"A Simple Dynamometer"

The discussion of this particular apparatus would not deserve more space, did not the criticism involve a principle applicable to a number of instruments for measuring the force exerted by plants. In his reply * to my former letter, Dr. Richards implies that I misunderstood his experiment; rather, I think, he has missed the point of my objection. I had no thought of criticizing his device because it does not measure the force of imbibition in all directions. The difficulty is that the proposed dynamometer does not register correctly *any* component of the force of swelling, for the simple reason that the spring scale is not adapted to do it. Gravitation can act through an indefinite distance and the weight in the pan descends until the distortion of the spring is as great as the force acting can produce. In swelling, on the contrary, the force to be measured acts through a very limited distance only, and when the limit of its thrust is reached the index stops, whether it indicates an ounce or a ton. The principle is that distortion of a system, however registered, can never be used to measure correctly any force, unless the possible distortion is greater than that necessary to produce the maximum registration of the instrument.

The caution regarding overloading, therefore, is not pertinent,

* Torreya, 1: 48. Ap. 1901.

because, owing to the limited displacement by the swelling, the spring could not easily be loaded beyond its capacity to register, although any component of the force acting is really vastly in excess of its powers to register in units of weight.

The objections made above do indeed apply to any apparatus not used in accordance with the principle enunciated. But Detmer is careful to say that his device* is only for the purpose of showing that external work is done by swelling seeds.

C. R. BARNES.

Notwithstanding the careful explanation given above by Professor Barnes the writer is still of the opinion that overloading from the standpoint of the *strength* of the spring is, as previously stated, entirely possible, and it seems too that this is the critical point.—H. M. RICHARDS.

NEWS ITEMS

Volume 7 of the Contributions from the Department of Botany of Columbia University has recently been completed by the publication of the 175th number of the series.

Dr. H. M. Richards, Dr. P. A. Rydberg and Miss Louise B. Dunn are spending their summer vacations in Europe.

Dr. D. T. MacDougal left New York on June 2d to conduct some special botanical investigations in western Montana.

Tracy Elliot Hazen, Ph.D. (Columbia University, 1900), has been appointed Director of the Fairbanks Museum at St. Johnsbury, Vermont, and enters upon the duties of the position this month.

Mr. Frederick H. Blodgett, recently a graduate student in Columbia University, is now an assistant in the botanical department of the Field Columbian Museum, Chicago.

Edward W. Berry, of Passaic, N. J., a member of the Torrey Botanical Club, has been awarded the Walker Prize of fifty dollars by the Boston Society of Natural History for an essay on *Liriodendron.*

* Pflanzen-Phys. Prakt. 119.

Professor L. M. Underwood of Columbia University, and Mr. O. F. Cook and party, of the U. S. Department of Agriculture, sailed for Porto Rico on June 8th for the purpose of studying the flora of that island.

The death of M. Henri Philibert, the European specialist in the genus *Bryum*, occurred on the 14th of May at Aix in France in his 79th year. He had just added a tenth article to his series of studies on the peristomé, which have appeared in the *Revue Bryologique.*

The tablet in memory of Asa Gray in the Hall of Fame of the New York University was unveiled on May 30 by Professors B. D. Halsted, B. L. Robinson and L. M. Underwood, representing the Botanical Society of America.

The third session of the Rhode Island Summer School for Nature Study will be held at the Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I., from July 5 to July 20. The botanical instruction is in charge of W. W. Bailey, H. L. Merrow, F. W. Card, A. B. Seymour and G. E. Adams.

"The Sea-Beach at Ebb-Tide" is the title of a recent book written by Augusta Foote Arnold and published by the Century Company. It contains non-technical descriptions and numerous illustrations of the larger and more common marine plants of the United States, together with a similar account of the littoral animals.

The entire palaeobotanical collection of Columbia University, and the books on palaeobotany from the University Library, except such minor part thereof as is needed at the University for undergraduate instruction, will be deposited with the New York Botanical Garden during the coming summer, under the terms of a supplementary agreement recently made between the two institutions. The museum of palaeobotany will be installed in one of the well-lighted basement halls of the Museum Building of the Garden.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 27, published in 1900, contained 678 pages of text and 33 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–27 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and No. 1, Part 1, of Vol. 8, has been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

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